Problema #1

$x+y=90$ $xy=máx$

$f(máx)=xy$

$f(máx)=x(90-x)$

$f(máx)=90x-x^2$ $x_l=0$ $x_u=90$

#1 iteracion

$x_1=x_l+\frac{\sqrt{5}-1}{2}(x_u-x_l)$ $x_2=x_u-\frac{\sqrt{5}-1}{2}(x_u-x_l)$

$x_1=0+\frac{\sqrt{5}-1}{2}(90)$ $x_2=90-\frac{\sqrt{5}-1}{2}(90)$

$x_1=55,62305$ $x_2=34,37694$

$f(x_1)=1912,15080$ $f(x_2)=1912,15059$

o

$x_1=x_l+\frac{\sqrt{5}-1}{2}(x_u-x_l)$ $x_2=x_u-\frac{\sqrt{5}-1}{2}(x_u-x_l)$

$x_1=34,37694+\frac{\sqrt{5}-1}{2}(90-34,37694)$ $x_2=90-\frac{\sqrt{5}-1}{2}(90-34,37694$

$x_1=68,75388$ $x_2=55,62305$

$f(x_1)=1460,75318$ $f(x_2)=1912,15080$

#2 iteracion

#3 iteracion

$x_1=x_l+\frac{\sqrt{5}-1}{2}(x_u-x_l)$ $x_2=x_u-\frac{\sqrt{5}-1}{2}(x_u-x_l)$

$x_1=34,37694+\frac{\sqrt{5}-1}{2}(68,75388-34,37694)$ $x_2=68,75388-\frac{\sqrt{5}-1}{2}(68,75388-34,37694)$

$x_1=55,62305$ $x_2=47,50776$

$f(x_1)=1912,15080$ $f(x_2)=2018,71114$

#4 iteracion

$x_1=x_l+\frac{\sqrt{5}-1}{2}(x_u-x_l)$ $x_2=x_u-\frac{\sqrt{5}-1}{2}(x_u-x_l)$

$x_1=34,37694+\frac{\sqrt{5}-1}{2}(55,62305-34,37694)$ $x_2=55,62305-\frac{\sqrt{5}-1}{2}(55,62305-34,37694)$

o

$x_1=47,50775$ $x_2=42,49223$

$f(x_1)=2018,71119$ $f(x_1)=2018,71109$

Problema #2

Datos

$A_L = 2\pi rh$ $\quad V = 2000\,cm^3$

$A_b = 2\pi r^2$ $\quad V = \pi r^2 h \Rightarrow h = \frac{V}{\pi r^2}$

$C = C A_L + 2C A_b$

$C = C(2\pi rh) + 2C(2\pi r^2)$

$C = C2\pi(rh + 2r^2)$

$C(r) = 2\pi\left(r\frac{V}{\pi r^2} + 2r^2\right)$

$C(r) = \frac{2V}{r} + 4\pi r^2$

$C(r) = \frac{4000}{r} + 4\pi r^2 \;;\; r > 0$

multiplicar toda la función por una constante (C) positiva no cambia dónde está ubicado el mínimo

$r_U = 0{,}00001 \qquad r_L = 10{,}00000$

#1 iteracion

$r_1 = r_L + \frac{\sqrt{5}-1}{2}(r_U - r_L)$

$r_1 = 10{,}00000 + \frac{\sqrt{5}-1}{2}(0{,}00001 - 10{,}00000)$

$r_1 = 3{,}81966$

$C(r_1) = 1230{,}55449$

$r_2 = r_U - \frac{\sqrt{5}-1}{2}(r_U - r_L)$

$r_2 = 0{,}00001 - \frac{\sqrt{5}-1}{2}(0{,}00001 - 10{,}00000)$

$r_2 = 6{,}18034$

$C(r_2) = 1127{,}20624$

#2 iteracion

$r_1 = r_L + \frac{\sqrt{5}-1}{2}(r_U - r_L)$

$r_1 = 3{,}81966 + \frac{\sqrt{5}-1}{2}(10{,}00000 - 3{,}81966)$

$r_1 = 6{,}18034$

$C(r_1) = 1127{,}20643$

$r_2 = r_U - \frac{\sqrt{5}-1}{2}(r_U - r_L)$

$r_2 = 10{,}00000 - \frac{\sqrt{5}-1}{2}(10{,}00000 - 3{,}81966)$

$r_2 = 7{,}63932$

$C(r_2) = 1256{,}97059$

#3 iteracion

$r_1 = r_L + \frac{\sqrt{5}-1}{2}(r_U - r_L)$

$r_1 = 3{,}81966 + \frac{\sqrt{5}-1}{2}(7{,}63932 - 3{,}81966)$

$r_1 = 5{,}27864$

$C(r_1) = 1107{,}92074$

$r_2 = r_U - \frac{\sqrt{5}-1}{2}(r_U - r_L)$

$r_2 = 7{,}63932 - \frac{\sqrt{5}-1}{2}(7{,}63932 - 3{,}81966)$

$r_2 = 6{,}18034$

$C(r_1) = 1127{,}20643$